



# LERU DOCTORAL SUMMER SCHOOL 2025, 22-27 June

## Updated programme to DOCT Steering Group members

November 28, 2024

### **Theme: *Artificial Intelligence across University Disciplines – Perspectives and Hands-on Experience***

The LERU Doctoral Summer School at UCPH aims at furnishing PhD students from a multitude of subjects with both theoretical perspectives on Artificial Intelligence and group-based hands-on experience in fields closely related to their own. The summer school will cover critical perspectives from technical AI experts, ethical and legal implications and pitfalls, and practical exercises.

The take-away from the summer school will be to dream big and use AI, but to cut hype away and use AI as a tool to improve research, and applications of research, for the good of humanity.

### **Draft programme**

All morning sections feature a selection of renowned speakers.

All afternoon sections feature hands-on group work in AI and data science tools requiring a sharp mind, but no prior programming experience (e.g., in the Konstanz Information Miner or a similar tool). Group work will be facilitated by a professor and teaching assistants.

We aim for a course that corresponds to approximately 2.5 ECTS.

	Sunday (22 June)	Monday (23 June)	Tuesday (24 June)	Wednesday (25 June)	Thursday (26 June)	Friday (27 June)
<b>Morning session</b>		<p>Welcome by Dean/Vice Dean.</p> <p>AI – the view from Olympus (non-technical overview by top computer scientist)*</p> <p>Legal conundrums and political issues in AI – talk by professor in law, Henrik Palmer Olsen, and professor in political science, Rebecca Adler-Nissen.</p>	<p>Large language models and ChatGPT – how do they work, and what are the problems – talk by professor in computer science, Isabelle Augenstein.</p> <p>AI in the life sciences – the story of AlphaFold and other things – talk by professor in biomolecular science, Kresten Lindorff-Larsen.</p>	<p>AI in the human and social sciences – talk by professor of computer science, Giovanni Colavizza.</p> <p>AI and the news media (talk by professor in media studies).</p>	<p>Complexities and physical limitations of AI – talk by physics professor, Søren Brunak.</p> <p>Work on group project.</p>	<p>Work on presentations for group project (short 10-minute talks about problem are followed by 10-minute presentations of technical solutions and results. Facilitated/helped by professor(s) and TAs.</p>
<b>Lunch</b>						
<b>Afternoon session</b>	Arrival and check-in.	<p>Group formation, introduction to data science tool. Choice of data set (a selection of data sets from different sciences and application areas will be presented).</p> <p>The group project work will be organized by associate professor in communication and IT, Rasmus Helles.</p>	Work on group project.	Work on group project.	Work on group project.	<p>Presentations to each other and to local Associate Dean and professors from the Faculty of Science.</p> <p>A toast and goodbye.</p>
<b>Evening session</b>	TBA (a max. of three social evening events, incl. dinner).	TBA	TBA	TBA	Dinner	

\*All talks will be approx. 1.5 hour in total with 45 min. presentation, 45 min. discussion and question session.

Speaker	Further description
Professor in law, <b>Henrik Palmer Olsen</b> , and professor in political science, <b>Rebecca Adler-Nissen</b>	<p><b><i>Legal and political conundrums in AI</i></b></p> <p><i>The past years have seen a dramatic rise in attempts to regulate and govern AI. What are the key motivations and aspirations driving this development? We will explore how the European Union's AI Act is characterized by a compromise between a desire for technological and economic innovation, on the one hand, and resistance to Big Tech and existential concerns about AI, on the other hand. Such compromises are characteristic of the emerging global landscape of AI governance, where attempts to set standards and principles around AI are shaped not just by technical concerns or profit-seeking interests, but by geopolitical tensions as well as ideologies, including the ideas cultivated by Bit Tech itself, which is actively involved in negotiating the rules that are supposed to reign them in.</i></p>
Professor in computer science, <b>Isabelle Augenstein</b>	<p><b><i>Factuality in the age of large pre-trained language models</i></b></p> <p><i>Natural language processing is currently experiencing a golden age, thanks to the emergence of chatbots powered by large pre-trained language models (LLMs), able to produce fluent and coherent responses to user input. This has resulted in a wealth of possibilities and enabled new downstream NLP applications. However, powerful as they might seem at a first glance, LLMs are opaque, and produce hallucinations, i.e. factually incorrect output, if used as is.</i></p> <p><i>In this talk, I will briefly outline the mechanisms behind large pre-trained language models and discuss their limitations. I will then present examples of how to reveal their inner workings, and how to test their outputs for factuality.</i></p>
Professor in biomolecular science, <b>Kresten Lindorff-Larsen</b>	<p><b><i>AI in biology: Is AlphaFold the perfect example of a biological application for machine learning?</i></b></p> <p><i>Machine learning methods are playing an increasingly large role in science to help make sense of experimental data, and to guide – or sometimes replace – laboratory experiments. One of the major scientific problems in biology – to predict the three-dimensional structure of a protein from its amino acid sequence – was effectively solved by machine learning via methods such as AlphaFold and was awarded the 2024 Nobel prize in chemistry. In the lecture, we will discuss what proteins are, why knowing their structures is important, and what AlphaFold has and has not solved.</i></p>

<p>Professor of computer science, <b>Giovanni Colavizza</b></p>	<p><b><i>AI in the humanities</i></b></p> <p><i>This lecture examines the growing role of Artificial Intelligence in advancing research within the humanities. From text digitization to cultural data analysis, AI enables the discovery of patterns and insights in historical and literary studies. Natural language processing is supporting linguistic research and aiding in the preservation of endangered languages. The application of AI to visual art and cultural heritage offers new possibilities of analysis and interpretation. The discussion will surface methodological challenges and ethical considerations, providing a critical view of how AI can support humanistic inquiry.</i></p>
<p>Professor in physics, <b>Søren Brunak</b></p>	<p><b><i>Multimorbidities, data drift and physical limitations of AI</i></b></p> <p><i>As populations get older, disease patterns are becoming increasingly complex. Patients suffer from many illnesses simultaneously. Analysis of risk factors and disease complications are made difficult by the fact that certain risk factors also can present as complications, thus representing “promiscuous” diseases that appear in quite different contexts. On top, new drugs and treatments are continuously developed changing multimorbidity trends over time. The talk will discuss machine learning approaches using data at scale from millions of patients, and the physical limitations these calculations entail.</i></p>
<p>Associate professor in communication and IT, <b>Rasmus Helles</b></p>	<p><b><i>Group project work</i></b></p> <p><i>The workshop invites participants to engage with substantial data sets through AI-powered analysis. Participants will have the opportunity to engage with a range of data sets provided by the organisers and will form groups based on their research interests and prior knowledge of AI-based analysis (note: no prior knowledge of programming or statistics is required.) The groups will engage in critical aspects of AI based methodologies through a combination of analytical challenges, critical reflection and hands-on data work.</i></p>